Security risks to energy production and trade

The problems of the Middle East

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This article examines the security risks to Middle East oil trade to try to answer two questions: Can armed forces defend oil installations? And if destroyed, could the military restore oil production and trade in the Middle East? The paper concludes that the Persian Gulf oil installations are largely indefensible although conventional forces will help deter attacks against the region. As long as the Persian Gulf remains the principal conduit for oil shipments from the Middle East, the threat of force against the Strait of Hormuz or the Gulf would be enough to disrupt oil trade. One of the best strategies is to build oil pipelines across Saudi Arabia to divert supply away from the Persian Gulf. Ultimately, however, security of Middle East Oil must be treated as a political rather than logistical problem. Only when internal Arab conflicts are resolved can the risk of terrorist or military attacks on oil installations diminish.

Keywords: Trade; Middle East oil; Security

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Over the past 10 years energy has become a subject of heated political debate and an instrument of political power. As a result energy installations are vulnerable to military attack, terrorism and other forms of interference. While all energy facilities are vulnerable, frequent attacks on such installations have occurred only in regions undergoing acute conflict.

The political instability of the Persian Gulf constantly jeopardizes petroleum production and trade. If war breaks out again in the Middle East, the oil facilities along the Persian Gulf would be prime objects of attack. Furthermore, any military force that can control the Strait of Hormuz would effectively cut off the export of oil.

The risks to oil production and trade in the Middle East pose a critical dilemma for the industrialized countries. On the one hand, any significant threat to the region's petroleum – especially to the oilfields of Saudi Arabia – could provoke a military response from the USA and its allies. On the other hand, the West would risk an expensive victory if in the course of intervention, armed forces destroyed the prize that they aim to preserve.

Much has been said about the need of oil consuming nations for an allied military presence in the Middle East, but less has been said about the ability to protect – or restore – key oil installations. Can the military defend oil wells and ports against air or land attack? If destroyed, could the armed forces and engineers restore the oil facilities and at what cost? While there are no easy answers to these questions, it is possible to characterize the principal risks to the oil logistical system and draw some conclusions about how – or if – the network can be secured.

Technical considerations

Each day, close to 25 million barrels (bbl) of oil are traded internationally, more than half of it coming from the Middle East. To handle this immense volume of petroleum, international companies have built up a vast logistical network centered in the Persian Gulf and

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spreading out worldwide.[1] The focus of this analysis will be on Saudi Arabia which accounts for nearly 33% of the oil traded internationally.

Oil production, like any other form of mineral extraction or industrial activity, is subject to a combination of political, economic and technical conditions. First, unless companies can explore for new resources, known reserves will decline. So, denial of access to oil-bearing areas can pose a long-term threat to world oil supplies. Furthermore, when oil recovery is interrupted suddenly or is poorly controlled, the productivity of oilfields can be impaired. The oil tap cannot be turned off and on arbitrarily without technical and economic consequences.[2]

Petroleum flows through pipelines from the oilfields to field storage tanks and then to storage tanks at refineries and ports. These pipelines must be entirely filled before oil can be transmitted. Pumps – usually computer controlled – force the oil through the line at roughly 3-5 miles an hour. While the flow of oil can be slowed down, it cannot stop entirely without also bringing to a halt the flow of oil from the wellhead. In short, production and pipeline transport are a continuous operation and interrupting one has an immediate impact on the other.

Pipeline routes

As Figure 1 illustrates, there are five major crude oil pipelines from the Persian Gulf to the Mediterranean. In recent years only three have been in use but together these five lines could pump as much as 4.6×10^6 bbl/day– just over 25% of Middle East oil output. Three lines run from the Kirkuk oilfields of Iraq to Banias in Syria, Tripoli in Lebanon and Dortyol in Turkey, all oil ports on the Eastern Mediterranean. The line to Turkey can pump 500 000 – 700 000 bbl/day, while the parallel lines to Banias and Tripoli can transmit 700 000 bbl/day and 500 000 bbl/day respectively. Thus, Iraq could export about 2.2×10^6 bbl/day – 66% of its usual output – by pipeline to the West.

The other east–west lines in the region transport crude oil from Saudi Arabia (see Figure 2). In the 1950s ARAMCO built a 754 mile line (known as Tapline) from the eastern fields through Jordan to the port of Sidon near Beirut. The line has a capacity of 470000 bbl/day. In the past years, the Saudis have shipped only a small amount of oil through this line to supply Jordan and Lebanon. However, the part of the line running to Sidon has been frequently ruptured or closed in the course of armed combat within Lebanon, or more recently by the Israeli air raids on southern Lebanon in June 1981.

The other Saudi crude oil line, which began operations in July 1981, runs for roughly 750 miles from the Abqaiq oilfield to Yanbu on the Red Sea. The line has an initial capacity of 1.85×10^6 bbl/day and could eventually pump 2.45×10^6 bbl/day (about 35% of Saudi current output). The line feeds oil to the refinery at Yanbu and Jeddah which together have a capacity of just over 200 000 bbl/day. From Yanbu oil shipments go north through the Red Sea to the Suez canal or through the Suez–Mediterranean pipeline to Alexandria for transit to ports in southern Europe.

The Red Sea and the Mediterranean could provide an important alternative route to the Strait of Hormuz and Arab Gulf for Middle East oil exports to Europe. The Saudis plan to build a second line from the Ghawar oilfield to Yanbu and in September 1981 gave Iraq permission to construct a new pipeline across the Saudi desert to an oil terminal slightly

This article is based on a chapter by the author in Charles K. Ebinger, *The Critical Link: Energy and National Security* (Ballinger, Boston, MA, USA, March 1982) which is the report of the Energy and National Security Project at the Center for Strategic and International Studies, Georgetown University, Washington, DC.

[1] At the 'up-stream' end (exploration and production) key facilities are on- and off-shore wells, pumps, gas–oil separators, water processing plants and pressure maintenance equipment. At the 'down-stream' end (refining and marketing) the major facilities are pipelines, pump stations, storage tanks, tankers, oil ports and industrial plants that use natural gas or oil such as refineries and power stations.

[2] Contrary to popular belief, an oil reservoir is not an underground lake full of petroleum. If it were, the oil would be easy to suck out. Instead, the reservoir resembles a hard sponge from which oil must be 'squeezed'. Rock formations ('petroleum' literally means 'rock oil') hold oil, water and gas trapped in microscopic pores. To extract oil, engineers must drill a well into the rock that provides an outlet for the oil and gas in the formation. Initially the oil flows down into the well under its own weight and rises naturally to the surface. However, as oil and gas leave the reservoir, natural pressure is reduced and the flow slows down. So the key to oil production is to maintain pressure in the reservoir artificially. In the Middle East, many – but not all – oilfields flow under natural pressure. In Saudi Arabia, for example, Damman No 10 on the Persian Gulf has flowed naturally since its discovery in 1938. However, Saudi Arabia produces the greater part of its oil by artificially maintaining the pressure in the reservoir with water injections. In support of 9.5 million bbl/day oil output, ARAMCO (the Arab American Oil Company) injects 11.8 million bbl/day of water into major oilfields. As oil and gas rise to the surface, they must be segregated by special gas–oil separators. In Saudi Arabia, a total of 58 gas–oil separators are in operation, each processing some 50000 barrels a day at least. A giant plant with capacity of 300000 barrels a day is located at the Abqaiq field where a previous unit burned down in 1978. Gas is either flared, stored or piped to industrial facilities for immediate use. In 1975 ARAMCO began construction of a Master Gas System to collect and process associated gas for fuel use, and petrochemicals. Gas also is used to generate electricity for the eastern oil-bearing province. The power plants are located in various parts of the region and should have a generating capacity of 5000 MW by 1982.

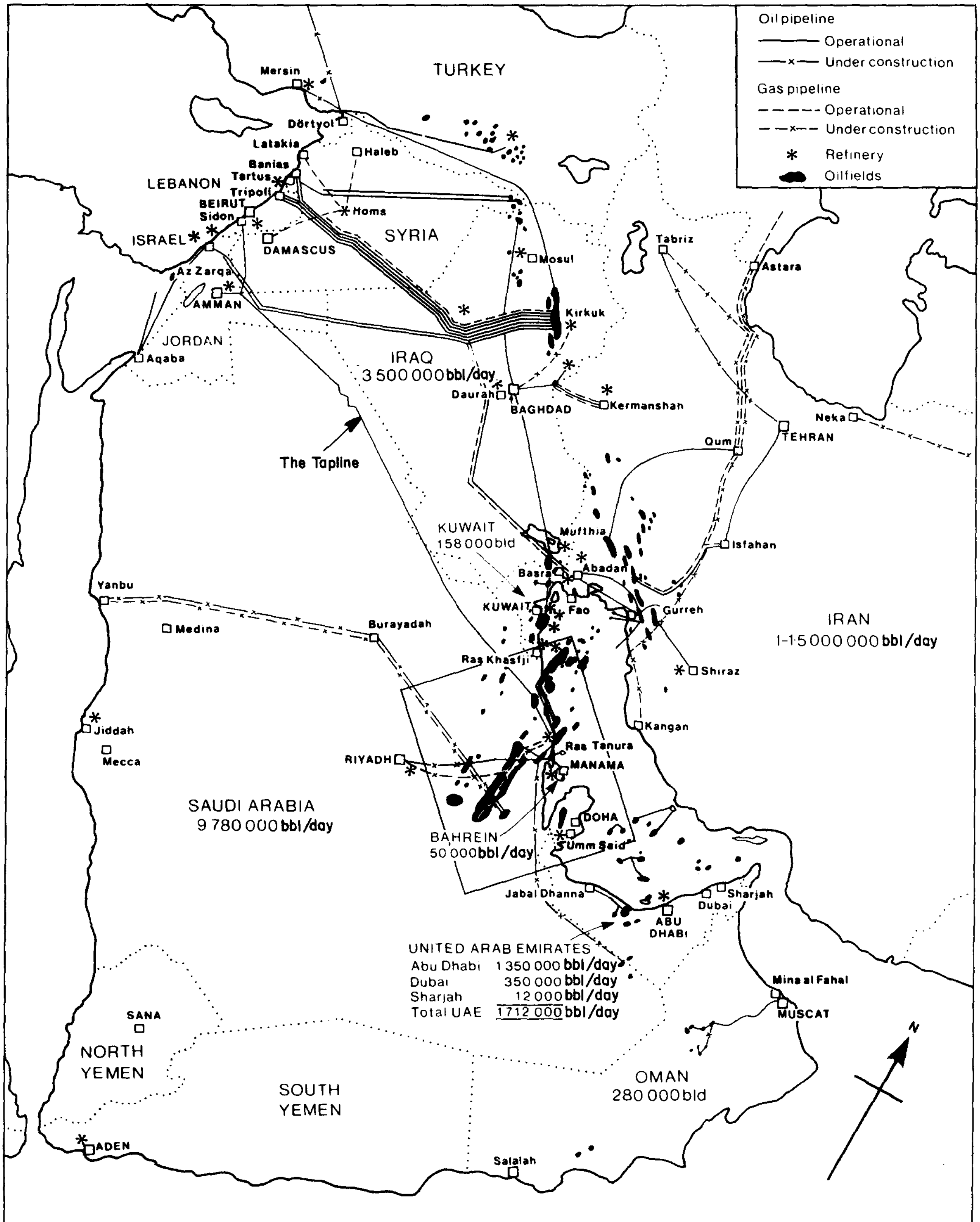

Figure 1. Major Middle Eastern oil pipelines.
Source: 'Middle Eastern report', *International Petroleum Times*, Vol 84, No 2126, 15 August 1980, p 16. *Note:* Boxed area is expanded in Figure 2.

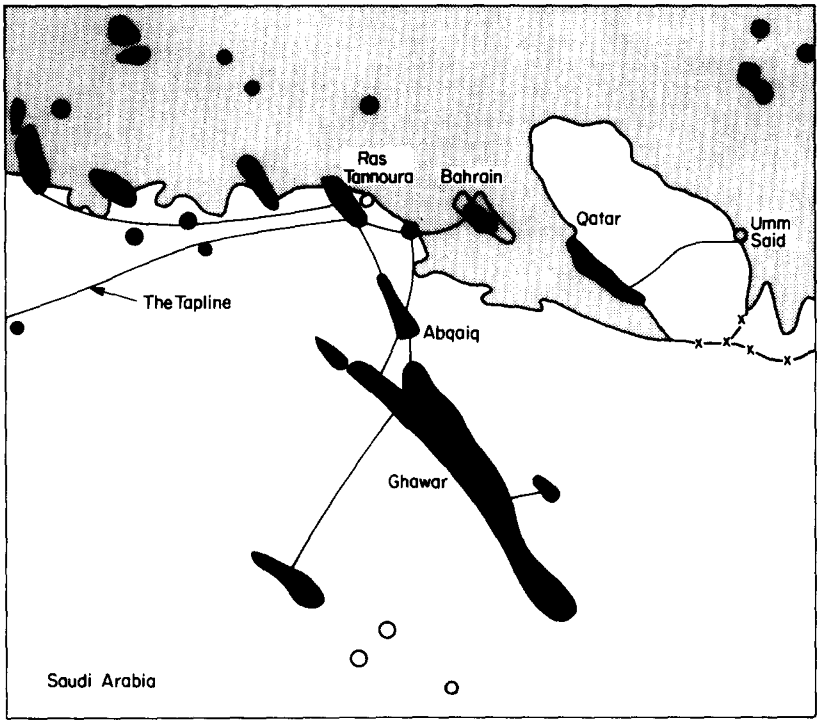

Figure 2. The major Saudi oilfields.

north of Yanbu. Since Iraq can already pump just over 2 × 10^6 bbl/day through existing lines, the new conduit could allow it to divert all oil away from the Persian Gulf route.

The ability to ship oil through the Red Sea and up through the Suez Canal has two major advantages: it relieves pressure on the Strait of Hormuz and creates an important commercial and strategic relation between Egypt and Saudi Arabia. Since Saudi Arabia will be able to send at least 50% and Iraq nearly all of its oil west by pipeline, the Strait of Hormuz would cease to be the principal choke point at which a hostile power could pinch off the oil flow. The Red Sea route also allows European importers to use smaller tankers at cheaper rates than the supertanker shipments to Europe via the Cape of Good Hope.

Finally, the extra shipping business that Egypt receives from the new tanker traffic should give it a strong incentive to patrol the upper portion of the Red Sea between Yanbu and Suez and cooperate with Saudi Arabia and Iraq to preserve the route's security.

The Persian Gulf

For other Middle East producers, the Mediterranean may not become a major trade route. The east and south Mediterranean ports are considerably smaller than those in the Persian Gulf and cannot accommodate supertanker traffic. The cost of using smaller tankers to go through the Mediterranean to the West or back round Africa to Southeast Asia would be prohibitive. Above all, political tensions in the area frequently interrupt fuel transmission. The pipeline from Saudi Arabia to Lebanon, the line from Iraq to Syria and from Iraq to Turkey have been objects of sabotage. As long as the conflict between Israel, Syria and Palestinian forces in Lebanon persists, the lines running across these territories cannot be considered reliable.

Because of the limited capacity of east–west lines and Mediterranean ports, the Persian Gulf will provide the principal route for oil cargoes in the foreseeable future. This waterway and its oil loading facilities now forge the critical link in the worldwide oil delivery system.[3]

Many of the Persian Gulf loading terminals for Saudi Arabia and the lower Gulf states are offshore where greater depths can accommodate supertankers. The size of the tanker that a port can handle determines the volume and route of oil cargoes. For example, very large or ultra large cargo carriers of 250 000 to 500 000 deadweight ton (dwt) could not be used in the Mediterranean because most of the ports are too shallow. The older fixed terminals at Ras Tanura in Saudi Arabia are also unsuitable as they can only receive tankers of up to 70 000 dwt. Thus, while supertankers are ideal for moving large volumes of petroleum over long distances, they lack the flexibility of smaller tankers that can move in and out of any port.

The flow of oil out of the Persian Gulf requires careful coordination. As one specialist notes,

> for the system to work, oil must go to precisely the right port and in the right mix of crude and product types as well as in the right total amounts. A shift in crude flows or product types or a shift in ports, can disrupt the web of tanker movements, refinery outputs and product distribution systems upon which every nation depends.[4]

Thus, even when supply matches demand, sudden upsets in the scheduling of tankers or the availability of specific crude oils can create a temporary shortage for customers in the world market.

The Strait of Hormuz provides the only passage in and out of the Persian Gulf. Each day as many as 300 vessels of various sizes including tankers carrying 66% of the world's oil go through this narrow water way. The strait is only about 25 miles wide with the channel for supertanker transport only 2 miles wide.

Oil interruptions

There has long been speculation that the strait could be closed by a blockade, mines or a few sunken or damaged tankers in mid channel. While the sinking of two or even three tankers would not prevent passage of other vessels, the psychological impact would send insurance fees rocketing and as a result, tanker traffic through the Gulf would slow down. The greatest threat to the strait, however, would be the placement of mines in the channel. According to one estimate,

> only 200 mines would be required to close the 25-mile strait. Another 50 mines might be added to this requirement to hedge against technical failures, misplaced drops and similar errors.[5]

Mines could be planted by submarines or aircraft. Furthermore the threat could be as disruptive as actually placing mines. If planes or ships appeared to be mining the strait – with large chunks of concrete, for example – ships would refuse to pass through the channel until a minesweeper declared the region safe. However, since such an action would not slow tanker traffic for very long, it could not set off a shortage in the world oil market.

The Iranian Revolution of 1978/79 and the Iran–Iraq war of 1980 vividly illustrated how vulnerable the entire production and distribution system is to political or military interference. Not only can such events immediately suspend oil exports but they are likely to have a long-term impact on the economies of producing countries and on the world market. When Iranian oil workers first went on strike in October 1978, Iranian oil output was roughly 5.5 million bbl/day but dropped within two months to just over 1 million bbl/day. Furthermore, even though Iran has proved reserves of 58 billion bbl – twice as much as the USA – its production remains less than half of US oil output. The main problem is a shortage of technicians and inadequate pressure maintenance in the reservoirs.

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[3] The oil loading terminals have been designed to receive oil from specific fields as well as blends of oil from different wells. Blended and segregated supplies of oil are stored in tanks on shore from which underwater pipelines carry oil out to loading terminals. These terminals are either fixed docks with berths or offshore facilities. The offshore terminals consist of large circular moorings that can handle either one or several ships at the same time. In either case underwater pipelines link the tanker to the storage tank. Pump stations for these lines rest on floating platforms.

[4] Abdul Kasim Mansur, 'The military balance in the Persian Gulf: who will guard the Gulf States from their guardians?' *Armed Forces Journal International*, November 1980, p 83.

[5] Barry M. Blechman and Arnold M. Kuzmack, 'Oil and national security', *The Naval War College Review*, Vol 26, No 6, Sequence No 249, May–June 1974, pp 12–13.

Before the revolution, the Shah of Iran had planned massive secondary recovery programmes to reverse the decline in oil production. In 1977 output peaked briefly at 8 million bbl/day but dropped thereafter because of declining pressure in the principal fields. When the Shah was deposed, however, the new regime abandoned his plans for installing major water and gas injection equipment and expelled most of the foreign oil technicians to pursue a policy of an 'all Iranian' oil industry.[6] Although the new government planned to keep production at 4 million bbl/day, productive capacity is now only 2 million bbl/day.

The Iran–Iraq war not only damaged the oil ports in the Northern Gulf but also called attention to the vulnerability of Saudi export facilities. At the time of the conflict, there was speculation that the war would spread through the region and place Saudi oil ports in jeopardy. To help protect these installations from air attack, the USA sent electronic surveillance aircraft, known as AWACS (airborne warning and control system), and a military support team to Saudi Arabia in September 1980.[7]

Military threats

Political instability in and around the Gulf raises serious questions about military threats to oil installations and the ability of producers and their western allies to deter those threats or repel actual attacks. The list of regional conflicts is well known: the Iran–Iraq war; skirmishes between North and South Yemen; and the ongoing conflict between Israel and its Arab neighbours. Internal political and religious conflicts could also arrest the flow of oil. Terrorist groups could use the threat of sabotage or actual sabotage to achieve their ends. Moreover, rival groups could start to do battle in or around the oilfields.[8]

The growing Soviet presence in the Middle East complicates an already explosive internal situation. Soviet military advisors are in Iraq, Syria, and South Yemen. Above all, the Soviet invasion of Afghanistan in December 1979 aroused fears that the Russians were poised to invade Iran and so be in a position to control the Persian Gulf. In response to that display of arms, President Carter stated that

> any attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States . . . and will be repelled by use of any means necessary, including armed force.[9]

With that warning, President Carter made a strategic commitment to the region that the Reagan Administration has accepted and that the US Congress and armed services must be prepared to fulfill. While it is beyond the scope of this paper to examine how the USA might execute a military campaign in the Persian Gulf, it is central to this analysis to assess whether or not the problem of oilfield security has a military solution. Can conventional ground and air forces deter attacks on Saudi oil installations? By placing sophisticated weapons and radar equipment in the area, would the West promote security or aggravate threats to the oil flow?

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[6] Joseph P. Riva, Jr, 'Iranian oil resources and production', in *Economic Consequences of the Revolution in Iran*, a compendium of papers submitted to the Joint Economic Committee, US Congress, 19 November 1979, p 112.

[7] The AWACS aircraft can detect low flying planes and missiles within a range of roughly 360 miles. This early warning system allows time to mobilize fighter aircraft to intercept an attack on the oilfields. The USA had previously deployed an AWACS in 1979 to monitor the Yemeni war on Saudi Arabia's southern border.

[8] In November 1979 pro-Khomeini Shiite muslims exchanged shots with the Saudi National Guard close to the Persian Gulf oil terminals. Since the Shiites are concentrated in the area around the Ghawar oilfield, an escalation of hostilities could affect petroleum operations.

[9] Terrence Smith, 'President says US would use military', *The New York Times*, 24 January 1980, p 1.

Possible military solutions

Because of unique geographical and demographic conditions, Saudi Arabia faces massive difficulties in protecting its territory and valuable oil installations against attack. First, the country is just under 900 000 square miles or roughly the size of the USA east of the Mississippi. The oilfields and ports along the Persian Gulf cover an area of some 70000 square miles – the size and shape of Portugal. While this province is the principal location of Saudi economic activity, the Saudis are building up an industrial complex of refineries, petrochemical plants and export facilities at Yanbu on the Red Sea. Thus, by the late 1980s, the Saudis will need the capability to defend both their east and west coasts.

Although Saudi Arabia is a large country the population is relatively small and disparate. Out of a population of roughly 8 million people only 4–5 million are native Saudis. The rest are foreign workers such as Palestinians, Pakistanis, and Koreans. Of the native Saudis, there are less than a million men fit enough or of the right age for military service. While total armed forces amount to 47 000, the National Guard which reports directly to the Royal family has 20000 men. Thus, the Saudis could turn out a fighting force of just under 70000 men at the start of a crisis.[10] By contrast, Israel, which has half the population of Saudi Arabia, could mobilize a force of 375 000 (male and female) in an emergency.[11]

Air defences

With enormous distances to cover and limited manpower, Saudi Arabia could not guard the oilfields with its armed forces alone. It must rely heavily on air defences to maintain constant surveillance of the eastern province and if necessary to intercept an air attack on key installations such as the oil ports. Thus, if Saudi Arabia had a comprehensive radar system and a fleet of fighter aircraft, it could deter or actually intercept an air raid on the scale of that which occurred in the Iran–Iraq war. Furthermore, a modern Saudi air force could withstand any air assault attempted by South Yemen.[12] Other possible Arab aggressors such as Syria, Jordan or Libya are too far away to fly a fighting mission in and out of the Persian Gulf.

Although a modern air force could help to deter some of Saudis' Arab neighbours from attacking the oilfields, it could not necessarily guarantee the security of commercial oil operations during an actual attack. Any aerial combat in the area of oilfields and ports could result in damage to those facilities. Furthermore, if any enemy were determined to destroy those installations, the pilot could nosedive in kamikaze fashion into the port or field. No amount of anti-aircraft weaponry on the ground or in the air could prevent damage to the fields below once action had broken out in the sky. Thus, a sophisticated air defence system may have some value as a deterrent but only limited ability to prevent damage to the oilfields in a military engagement.

Even with an upgraded air defence system, however, Saudi Arabia would be poorly prepared to defend the oilfields against many other possible threats. The Saudi air force alone could not intercept strategic strikes by Israel. Furthermore, no air force in the area, whether Arab or

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[10] The International Institute for Strategic Studies. *The Military Balance 1980–1981*, IISS, London 1980, p 47.

[11] *Ibid*, p 43.

[12] South Yemen has traditional border and tribal disputes with Saudi Arabia.

Israeli, could meet a serious threat from the USSR. Finally there are other risks to the oil installations on the ground which conventional air defences would not cover. These threats emanate from political conflict or terrorist activities in and around the Saudi oilfields.

The possibility of an Israeli attack on Saudi military and energy facilities cannot be ruled out if the Arab–Israeli conflict ever resumes and Israel perceives a security threat from Saudi Arabia. The Israelis have demonstrated their expertise in destroying military and industrial facilities. In the October war of 1973, they destroyed the oil-storage depots and terminals at Banias and Tartus in Syria, actions that crippled the Syrian economy. PLO headquarters and oil pipelines and refineries in Southern Lebanon have also been bombed (June 1981). The attack on oil facilities created fuel shortages in the region. Finally, in a surprise air attack, the Israelis destroyed the OSIRAK nuclear reactor near Baghdad (June 1981).

Israeli strategists regard such attacks as essential to a successful defence in times of crisis and in some instances to their long-term security (notably the destruction of OSIRAK). According to one report,

> these analysts suggest that the commandos, and the air and naval units, should attack both military and strategic targets – army camps, missile batteries, power plants, factories, dams, bridges, air and sea ports, rail and bus terminals and city centers.[13]

A steady wave of attacks would destroy the enemy's logistical network and 'its economy would be ruined.'[14]

Israel would have great difficulty executing a series of attacks on Saudi Arabia's eastern oil province. Nevertheless, given Israel's superiority in such strategic air manoeuvers, it could succeed in knocking out a few of the crucial energy installations or parts of the air defence system – air-borne and ground radar equipment – that help to protect the oilfields.

Superior influence/intervention

To a large extent, the USA has some political leverage over Israel to deter it from any kind of assault on Saudi Arabia. However, where Israel's security is concerned, its actions can be unpredictable and possibly at odds with US interests. Thus, it is critical to US security policy in the Middle East to provide Israel with sufficient guarantees of US support and incentives not to conduct pre-emptive strikes against Saudi air defences in the event of a new crisis in the Middle East.

The defence needs of Saudi Arabia would completely change if the USSR moved from Afghanistan into Iran or if Iran fell into the hands of a pro-Soviet regime. As long as the Soviets must deploy from their borders with Iran, the USA and Saudi Arabia would have time to mobilize their forces to meet a Soviet attack. If the Russians had bases within Iran, they could reach the Saudi oil installations in about 10 minutes flying time. From that position, the USSR could gain complete control of the Persian Gulf. To protect its 'vital interests', as defined in the Carter doctrine, the USA would send naval and ground forces into the Persian Gulf.

Effect on oil

If the USA and USSR deployed forces in the Persian Gulf, oil transport would effectively cease. Even if neither side actually made strikes at oil installations, the entire area would become a crisis zone. Insurance brokers would place such a high premium on tankers in the area that some cargoes might not leave the Gulf at all. Nevertheless, some tankers would still go out under military escort as long as the Strait of Hormuz remained open. If the strait were blocked, mined or threatened by a show of arms, tanker traffic would come to a halt.

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[13] Benny Morris, 'New Strategic thinking in Israel', *Armed Forces Journal International*, September 1980, p 84.

[14] *Ibid.*

Under these circumstances the transmission of oil by the east–west pipelines would become vital to maintaining basic energy operations in Saudi Arabia. As noted above, oil production and transport are part of a continuous process. When transport is interrupted, production must be cut back for the simple reason that once oil is extracted, it must have somewhere to go above ground. Thus, even to preserve the lowest possible level of oil and gas production, the producer must have a conduit for the oil and gas. Most important of all, Saudi Arabia needs to keep up oil and gas production to have electric power. Saudi Arabia generates electricity from gas-powered turbines. Most of this gas is produced in association with oil. So to have a fuel supply for electricity, the Saudis must maintain a certain level of petroleum output, keep gas–oil separators in operation and gas flowing to electric generators. If the east–west pipelines were destroyed, however, the Saudis would not be able to maintain the minimum of oil production for generating electricity.

It lies beyond the scope of this article to explore if or how a confrontation between the USA and the USSR in the Persian Gulf would be resolved. It is clear, however, that the use of force by either side would paralyse oil operations in the area. Nevertheless, if there were enough pipelines carrying oil west to the Mediterranean, then a blockade of the Strait of Hormuz or some other show of force in the Persian Gulf would not be enough to halt the flow of oil.

Therefore military control of the Persian Gulf would no longer constitute an intolerable threat to the region and its oil resources. Indeed, to halt the flow of oil, the Soviets would be forced to fly well into the Saudi interior to strike at the pipelines, a mission far more difficult than simply deploying forces to the Persian Gulf. In short, the construction of east – west pipelines could prove to be a more effective defence for the oilfields than the conventional radar and weapon systems that the Saudis plan to install.

Terrorist attack

Even if the Saudis build strategic east–west pipelines and modernize their air and ground defences, the oilfields and ports could still remain vulnerable to sabotage by terrorists. The presence of airborne or ground radar systems or of F-15 fighter aircraft will not deter a determined group of terrorists from dismantling key elements of Saudi production equipment.

For example, since Saudi Arabia relies on water pressure maintenance for nearly all of its production, damage to giant water processing plants could interrupt oil supply. Similarly the wrecking of gas–oil separators, crucial to the recovery process, could slow down production for weeks or even months depending on the availability of parts and technicians to repair the facilities. Terrorists could knock out the system more efficiently and at far less cost than the combined air forces of Iran and Iraq. Furthermore they could do so far from the oil ports or the Strait of Hormuz on which recent strategic planning has been focused.

With its small and disparate population Saudi Arabia does not have a security force large enough or reliable enough to guard every facility against sabotage. As one Saudi security official has stated, 'we can't protect every inch of pipeline. It would take all our troops'.[15] Indeed, few of the key installations in Saudi Arabia are adequately guarded.[16]

Not only are major facilities poorly guarded. If they were damaged, there could be a shortage of parts or technicians to repair the equipment. Many Saudi production facilities are unique in their size and specifications. As one analyst points out,

> this problem can only be dealt with by pre-purchasing and stocking such equipment, but no current plan exists to take these steps. Accordingly regardless of the Saudi regime, Western oil supplies will be acutely vulnerable to even low levels of paramilitary violence.[17]

Finally, as the disarray of Iranian oil production reveals, a force of skilled technicians is needed to maintain – and possibly restore – oil recovery. If strikes by oil workers or terrorist attacks cripple oil operations in Saudi Arabia, could the USA step in to maintain both civil order and restore production? Could the USA do so without the permission of the Saudi regime – whatever that might be – after such an upheaval? First, the USA would face massive political and military difficulties if it attempted to intervene in Saudi internal affairs. Furthermore, the US government would need to conscript engineers from US companies and protect this technical team in a combat zone. There is no precedent for drafting a civilian labour force of this kind and the legal and logistical implications of maintaining such a team raises a host of questions that have yet to be analysed. However, it is unlikely that armed forces, even with the help of a civilian technical corps, would be up to the task of restoring production and trade. The problem would be particularly acute in Saudi Arabia because it has so many unique oil installations which, if destroyed, could not be readily duplicated or repaired.

Conclusions

The conclusion must be that going to war because of oil would be far more perilous to the West than undergoing the economic disruption that would occur during a suspension of oil exports from Saudi Arabia. While helping Saudia Arabia to build up its military defences and increasing the allies' capability to reach the Middle East rapidly, the USA must regard such measures as solely deterrent. They raise the risks that any aggressor would take in attacking the Persian Gulf and the oil installations along it. Under no circumstances, however, would an open battle between the USA and the USSR or between the Saudi military and regional opponents help to preserve the flow of oil. Even the threat of military mobilization would be enough to halt oil exports from the region.

By diversifying trade routes and the means of transport, the oil producers could, however, greatly reduce the vulnerability of the transport system to external attack. They would gain considerable commercial and strategic advantage if they built east–west pipelines that could convey most of their oil out of the area over land instead of through the Persian Gulf. At present a military power could cut off oil exports by deploying forces in and around the Persian Gulf. With pipelines in place, however, the producers would eliminate the Persian Gulf as a choke point. To disrupt trade, an aggressor would need to conduct more risky manoeuvres against the oilfields and pipelines instead of simply displaying its forces at the Strait of Hormuz or along the Persian Gulf.

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[15] Walter S. Mossberg, 'As mideast heats up, US frets over peril to the Saudi oil fields', *Wall Street Journal*, 21 January 1980, p 1.

[16] At Ras Tanura, one journalist reported that he was able 'to drive onto one of the piers with a forbidden camera and approach an Iraqi tanker on foot without once being stopped or searched by the single guard on duty'. See Mossberg, *ibid*.

[17] Mansur, *op cit*, Ref 4.

Ultimately, the security of the Persian Gulf oil must be treated as a political problem, rather than a logistical one. The external and internal threats to the flow of oil arise from the political instability of the entire region. Diplomatic measures must be taken to defuse the charged political atmosphere of the region – principally to resolve the Arab–Israeli conflict. For as long as the Middle East suffers from hostilities between the Arabs and Israelis and other internal conflicts, the West's oil supply will remain in jeopardy.